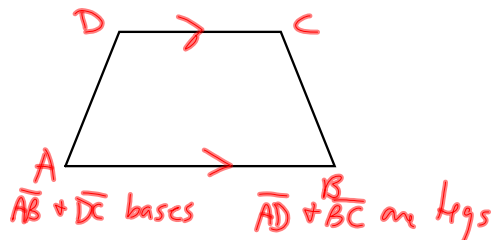


8-5 Use Properties of Trapezoids and Kites

trapezoid--quadrilateral with exactly one pair of parallel sides



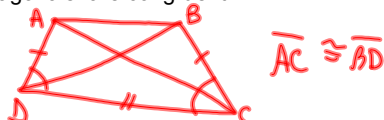
isosceles trapezoid-- congruent legs



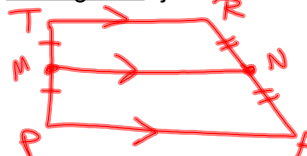
Theorem 8.14--If a trapezoid is isosceles, then each pair of base angles is congruent

Theorem 8.15--If a trapezoid has a pair of congruent base angles, then it is isosceles.

Theorem 8.16--A trapezoid is isosceles iff its diagonals are congruent

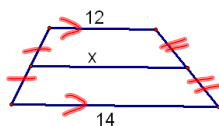


Midsegment--joins the midpoints of the legs



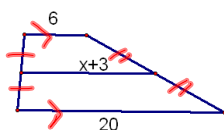
Theorem 8.17--The midsegment of a trapezoid is parallel to the bases and $= \frac{1}{2}$ the sum of the lengths of the bases

$$\overline{MN} \parallel \overline{TR} \parallel \overline{PA} \quad MN = \frac{1}{2}(TR + AP)$$



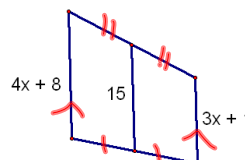
$$x = \frac{1}{2}(12 + 14)$$

$$x = 13$$



$$x + 3 = \frac{1}{2}(6 + 20)$$

$$x = 10$$



$$\frac{1}{2}(4x + 8 + 3x + 1) = 15$$

$$7x + 9 = 30$$

$$x = 3$$

Verify that ABCD is a trapezoid.

A(5, 1)
B(-3, -1)
C(-2, 3)
D(2, 4)

$$\begin{aligned}\overline{AB} \quad m &= \frac{1}{4} \\ \overline{CD} \quad m &= \frac{1}{4} \\ \overline{BC} \quad m &= \frac{4}{1} \\ \overline{AD} \quad m &= -1 = \frac{3}{-3}\end{aligned}$$

$\overline{AB} \parallel \overline{CD}$
 $\overline{BC} \nparallel \overline{AD}$

What are the endpoints of the midsegment?

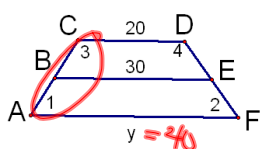
A(5, 1)
B(-3, -1)
C(-2, 3)
D(2, 4)

$$\begin{aligned}\overline{BC} \quad M &\left(-\frac{5}{2}, 1\right) \\ \overline{AD} \quad M &\left(\frac{7}{2}, \frac{5}{2}\right)\end{aligned}$$

Is it isosceles?

$$\begin{aligned}BC &= \sqrt{12^2 + 4^2} = \sqrt{17} \\ AD &= \sqrt{(3)^2 + (-3)^2} = \sqrt{18}\end{aligned}$$

Not isos



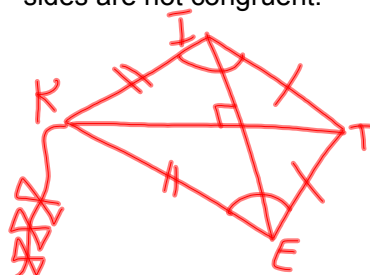
Isosceles trapezoid ACDF

$$m\angle 1 = 3x + 5$$

$$m\angle 3 = 6x - 5$$

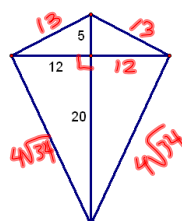
$$\begin{aligned}9x &= 180 \\ x &= 20\end{aligned}$$

Kite--a quadrilateral that has 2 pairs of consecutive congruent sides, but opposite sides are not congruent.



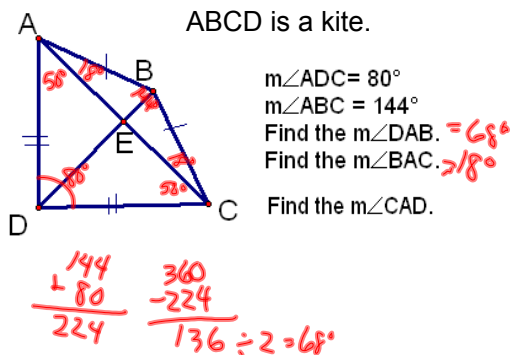
Theorem 8.18--If a quadrilateral is a kite, then its diagonals are perpendicular.

Theorem 8.19--If a quadrilateral is a kite, then exactly one pair of opposite angles are congruent.



Find the lengths of the sides of the kite.

$$\begin{aligned}12^2 + 20^2 &= \\ \sqrt{544} &= 4\sqrt{34} \\ 17^2 &= 289 \\ 16^2 &= 256\end{aligned}$$



HW

p546-548

5,7-15, 18-22, 25-27,
30, 32,39